

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
20 March 2003 (20.03.2003)

PCT

(10) International Publication Number  
**WO 03/024069 A1**

(51) International Patent Classification<sup>7</sup>: **H04M 1/64**

(21) International Application Number: PCT/US02/09621

(22) International Filing Date: 29 March 2002 (29.03.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/318,668 13 September 2001 (13.09.2001) US

(71) Applicant (for all designated States except US): **XCITEL LTD.** [IL/IL]; P.O. Box 58022, 61580 Tel Aviv (IL).

(71) Applicant (for TJ only): **FRIEDMAN, Mark, M.** [US/IL]; 1 Alharizi St., 43406 Raanana (IL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SHAKED, Yoav** [IL/IL]; 43 Spinoza St., 43588 Raanana (IL). **ROSEN-MAN, Zvi** [IL/IL]; 3 Dov Gruner St., 69498 Tel Aviv (IL).

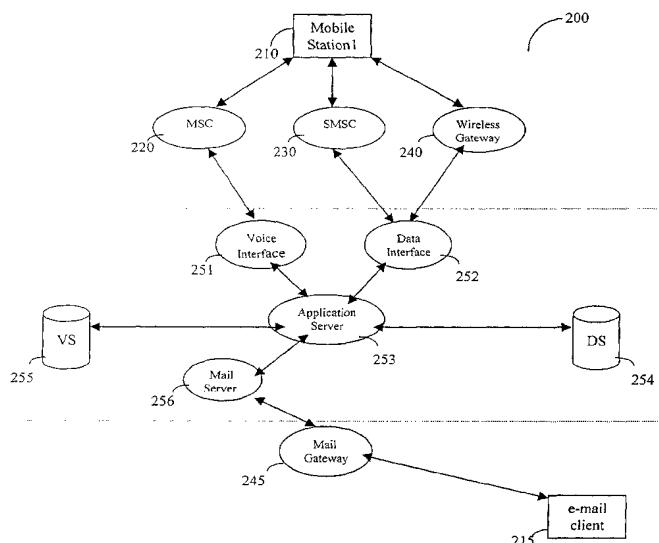
(54) Common Representative: **FRIEDMAN, Mark, M.**; c/o Discovery Dispatch, 9003 Florin Way, Upper Marlboro, MD 20772 (IL).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR HANDLING MULTI-PART MESSAGES SENT TO E-MAIL CLIENTS FROM CELLULAR PHONES



(57) Abstract: A system and method (shown in Figure 2) for enabling users of existing mobile handsets and wireless architecture to create and manage messages composed of both text and multimedia attachments, and communicate these messages to email users, where they may be processed and utilized by standard email application software. The process of creating such a message includes the steps of using SMS to create a text message, with the destination email address included, as well as using a voice session to create a voice attachment. The text message is subsequently converted into the text of a conventional email message, and the voice message is attached to the email. The email message is then sent, for example by using an email server and email gateway, to the destination address.

**WO 03/024069 A1**



**Published:**

— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## METHOD AND SYSTEM FOR HANDLING MULTI-PART MESSAGES SENT TO E-MAIL CLIENTS FROM CELLULAR PHONES

### Other References

5 Short Message Service (SMS); Point-to-Point (PP) (Global System for Mobile Communications); 03.40 version 6.1.0 Release 1997; European Telecommunications Standards Institute.

Global System Mobile (GSM) standards 09.02 and 03.40; European Telecommunications Standards Institute.

10

## FIELD AND BACKGROUND OF THE INVENTION

### 1. Technical Field

The present invention relates generally to wireless communication devices and, in particular, to a system for handling voice in addition to data messages sent to users of e-mail, by users of standard wireless communication devices.

### 2. Description of the Related Art

Mobile telephone usage for conventional voice communication has expanded rapidly. In recent years there has also been a significant increase in data communication over the wireless channels. The need for systems to facilitate the usage and management of voice and text using wireless communication devices has led to various new developments in the wireless communications market. Currently available technologies, enabling the transfer of text over mobile phones, are generally associated with the Short Messaging Service (SMS), while technologies enabling the management of voice messages over mobile phones are generally associated with voicemail.

SMS technology allows SMS-enabled cellular phones, such as digital cellular networks, including Global System Mobile (GSM), CDMA and TDMA, to transfer short textual messages between two parties. Typically, messages are 100 to 256 characters long. SMS allows the creation of text messages either on mobile handsets or by computer systems, and receiving of such text messages on mobile handsets. Recent technologies

30

further allow the transfer of images (icons) along with SMS Messages. Within the definition of more recent technology, referred to as 3G (third generation) mobile telephony technologies, there are available features that enable the transfer of audio and video clips as attachments to messages, which are exchanged between mobile handsets or, between mobile handsets and e-mail clients. However, these 3G technologies are not available when using current handsets and wireless architectures, and require massive hardware upgrades in both network and client systems. Such future technologies include Universal Mobile Telecommunications System (UMTS) and Wideband-CDMA (CMDA 2000).

10        Voicemail technology allows depositing of voice messages in a user's voicemail box, so that a user may later access that box, usually by using technologies such as Interactive Voice Response (IVR) systems, to retrieve previously stored voice messages.

15        SMS notification for voicemail messages is commonplace today, wherein the user is notified by a SMS message when a new voicemail has been deposited in his or her voice mailbox. However, the integration between SMS and voicemail is not tight, since after receiving an SMS notification, the user is still required to log on to the voicemail system in order to obtain a new message. In most cases the user needs to navigate through voice menus for the retrieval of the desired message. It is generally not possible to browse visually through the stored messages in order to locate a certain message.

20        The ability to create an SMS message and to attach a voice message or any kind of data attachment (referred to as "multi part messages" or "MPM") over a cellular telephone is described in detail in PCT patent application IL01/01166, titled "A Method and System for Handling Multi-Part Messages by Users of Cellular Phones", assigned to common assignee, and which is which is fully incorporated herein by reference, as if fully set forth herein.

25        Reference is now made to Fig. 1, illustrating an exemplary system **100** for handling a MPM. System **100** is operated through various software components, such that system **100** enables composition, management, storage and tracking of MPMs. These components optionally include SIM toolkits, as well as protocols including DTMF, IVR,

WAP, etc. The core technology of the system is a software component, which is part of application server **170** that coordinates and controls the activities of system **100**. These components comprise means for creating, managing, manipulating, monitoring and communicating multi-part messages using wireless communication devices, including

5 cellular phones. A MPM is composed over mobile station **110**. The voice part of an MPM is transferred to a voice interface **150** via mobile switching center (MSC) **120** where the textual part is transferred to a data interface **160** via short message service center (SMSC) **130** or via a wireless gateway **140** such as WAP gateway, HTML gateway, CHTML gateway, XML gateway. Incoming MPM are saved in storage devices **180** and **185**,  
10 where textual data is stored in main database **185** and voice data is stored on voice storage **180**. Application server **170** executes manipulations and services initiated by an incoming request. Application server **170** main databases **185**, voice storage **180**, voice interface **150**, and data interface **160** communicate via common communication means **190**, including but not limited to local area network (LAN), wide area network (WAN),  
15 and the others. System **100**, described above provides a means for sending and receiving a multi part message over cellular phones.

The basic capabilities of the cellular phones utilized in the current networks, as described, include voice communications; Short-Message-Services (SMS); SIM Toolkit capabilities (STK), and Wireless Application Protocol (WAP) support, which also  
20 include the ability to handle Wireless Markup Language (WML) directives with a WML browser or an equivalent directive.

It would be likewise advantageous to have a method and a system that can provide for the integration of voice and data communications between wireless communication devices and e-mail users.

25

## SUMMARY OF THE INVENTION

According to the present invention there is provided a system and method for enabling users of wireless communication devices, including mobile and cellular handset users, to create email compatible messages comprised of multimedia attachments and an  
30 optional text message. According to the present invention, these messages can be

composed using commonly available wireless handsets and sent to e-mail clients, where they may be processed and utilized by standard email application software.

The process, according to the present invention, includes the following steps:

A subscriber composes an MPM over a cellular phone. First the subscriber types a short text message using, for example, the cellular phone keypad. The subscriber also enters the recipient's e-mail address at, for example, the beginning of the text message. A voice session is subsequently established between the subscriber cellular phone and voice interface unit, via MSC. The subscriber dials to the application server, with a dial-up number, and records his or her message via MSC. Following this, a Mail Server converts the multi part message to an e-mail message in SMTP/ESMTP or MIME formats or in any equivalent e-mail messaging format. First, a voice message is converted to a voice file in WAV format, MP3 format, or any other type of digital audio format, in a compressed or uncompressed format. Mail server stores the voice file in a storage database. The text part of the e-mail message is then converted from SMS message to an e-mail message. The e-mail message is subsequently prepared, and includes, in this example, a text part and a voice part. The voice part is a voice file that appears as an attachment to the textual message. Finally, the message is sent from a mail server to an e-mail client through a mail gateway. The e-mail client receives the MPM as an e-mail message with a voice attachment.

20

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

25 Figure 1 – illustrates an exemplary (prior art) system for handling a multi part message.

Figure 2 - illustrates a system for depositing of multi part message over cellular phones with an e-mail client destination.

30 Figure 3 - illustrates a method for depositing of multi part message over cellular phones with an e-mail client destination.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a system and method for enabling users of wireless communication devices, including mobile and cellular handset users, to create email compatible messages comprised of multimedia attachments and an optional text message. According to the present invention, these messages, which may be combinations of text, voice and image data, can be composed from commonly used wireless handset and sent to e-mail clients.

The following description is presented to enable one of ordinary skill in the art to make and use the invention as provided in the context of a particular application and its requirements. Various modifications to the preferred embodiment will be apparent to those with skill in the art, and the general principles defined herein may be applied to other embodiments. Therefore, the present invention is not intended to be limited to the particular embodiments shown and described, but is to be accorded the widest scope consistent with the principles and novel features herein disclosed.

Specifically, the present invention can be used to send SMS messages together with voice attachments, or other types of attachments, referred to as multi-part messages (MPMs). MPMs can be dynamically created or edited, or pre-generated and kept in a central repository of the preferred system. These attachments may be, for example, one or more of bit-map icons, vocal tones, audio clips, video clips, business card information and any other data attachments. A MPM can be, for example, an SMS combined with a voice message, or two SMS messages, etc. The MPM as described above can be sent to e-mail clients, from wireless communication devices, including cellular phones.

The principles and operation of a system and a method according to the present invention may be better understood with reference to the drawings and the accompanying description, it being understood that these drawings are given for illustrative purposes only and are not meant to be limiting, wherein:

Reference is now made to Fig. 2, which illustrates a system for depositing of multi part message from a wireless communication device, including mobile or cellular phones, to an e-mail client. System 200 is operative through various software components

that enables composition, management, storage and tracking of MPM, which are composed by subscribers using communication devices and subsequently sent to e-mail clients. These components optionally include SIM toolkits, as well as protocols including DTMF, IVR, WAP, etc. The core technology of the system is a software component, in application server 253, that coordinates the various components of system 200. These components comprise means for creating, managing, manipulating, monitoring and communicating multi-part messages.

Application server 253 executes applications and services based on incoming requests. These requests may be either from voice interface 251 or from data interface 252. Voice interface 251 runs all the voice related activities and interfaces, includes a line interface card, such as E1/T1, ISDN, SS7 or the likes. Data interface 252, executes all data related activities and interfaces and provides seamless support for connectivity with wireless communication devices, such as standard mobile and cellular devices, including WAP phones, STK phones, SMS phones and handheld devices such as Palm®, EPOCH®, and PocketPC®. Voice storage 255, is a high-speed storage device that handles all voice related storage activities. Data storage 254, is a standard storage device that contains all information to be stored and retrieved on behalf of server application 253 such as run time transaction information, provisioning information, user data etc. System 200 communicates with mobile station 210 through mobile switching center (MSC) 220 for voice transactions, and through short message service center (SMSC) 230 or through wireless gateway 240 for data transactions. Wireless gateway 240 may be WAP gateway, XML gateway, CHTML gateway, HTML gateway and any other wireless gateway. System 200 includes two additional components, mail server 256 and mail gateway 245. These components allow the creation and handling of e-mail messages.

Mail server 256 executes all e-mail activities related to converting a message from SMS with voice attachment (MPM) to an e-mail message. Mail server 256 creates an email message that includes the textual message of the MPM and the audio file of the MPM, as a voice attachment. The email message is created so as to be compatible with standard e-mail formats such as SMTP/ESMTP or MIME. Mail gateway 245 executes all activities related to transferring the resulting email message to an e-mail client 215. The

steps used by the Mail gateway 245 to transfer the email message to an email client are commonly known in the art. Mail gateway 245 communicates with mail server 256 through SMTP/ESMTP protocols. E-mail client 215 communicates with mail gateway 245 using POP3 or IMAP4 protocols. E-mail client 215 may be any type of device with 5 the capability of sending and receiving e-mail messages, such as Microsoft Office Outlook ®, Microsoft Outlook Express®, Lotus Notes®, etc.

A reference is now made to Fig. 3, which illustrates the depositing of an MPM over cellular phone with an e-mail client destination. It should be noted that Fig. 3 does not exemplify the methods for composing a message over the different basic cellular 10 phones (WAP phones, STK phones and SMS only phones). These methods are described in detail in PCT patent application IL01/01166, titled "A Method and System for Handling Multi-Part Messages by Users of Cellular Phones", assigned to common assignee, which is fully incorporated herein by reference, as if fully set forth herein. Fig. 3 includes the following acronyms:

15 MS - Mobile Station  
SMS - Short Message Service Center  
MSC - Mobile Switching Center  
DI - Data Interface  
VI - Voice Interface  
20 VS - Voice Storage  
AS - Application Server  
DB - Database  
WG - Wireless Gateway  
EMS - e-mail Server  
25 EMG - e-mail Gateway

Following is a detailed description of the steps described in Fig. 3.

Step 310: Subscriber 210 composes an MPM over a cellular phone. First subscriber types a short text message using, for example, the cellular phone keypad.  
30 Subscriber 210 also enters the recipient's e-mail address at, for example, the beginning of

the text message, and specifies a system's short -code number in the destination field. The "short code number" is used as a service identifier, to indicate to the system receiving the message that it is a MPM, and it is therefore routed to the system capable of handling such messages. Additionally, subscriber **210** may enter other information

5 relevant to sending of an SMS, like validity period, reply-options, etc. The composed message is submitted through SMSC **230**, or through wireless gateway **240**, depending on the type of the device, to data interface **252**. Optionally, the message can be sent to a distribution list containing more than one subscriber, as facilitated by the cellular phone distribution-list mechanism (sometimes referred to as "groups"), or through an external  
10 distribution list, kept on the system. The text message is stored in data storage **254**, using application server **253**.

Step 320: A voice session is established between the subscriber **210** cellular phone and voice interface **251**, via MSC **220**. The voice session establishment is triggered  
15 by the subscriber **210** dialing the system **200** dial-up number. Over this voice session, subscriber **210** records his or her message. The dial-up number may be a previously assigned number to the particular user being targeted, or a number provided by the system on a case-by case basis. Alternatively, after storing the text-message, system **200** may send an SMS to subscriber **210**, and subscriber **210** may use the SMS reply option to  
20 that SMS, namely sending back a SMS to the system in order to establish a voice session. Upon receiving this reply SMS, system **200** will initiate the voice session, via the voice interface **251** and MSC **220** to subscriber **210**. After establishing a voice session, subscriber **210** is prompted to record his or her message. The application server **253** stores the resulting voice-message in the voice storage **255**.

25

Step 330: Mail server **256** converts the multi part message to an e-mail message in SMTP/ESMTP, MIME or in any equivalent e-mail messaging format. First, mail server **256** obtains the recorded voice-message from voice storage **255** and converts it to a voice file in WAV, MP3, audio (AU), audible (AUD), audio interchange file format (AIFF),

audio interchange file (AIF), or any other type of digital audio format, in a compressed or uncompressed format. This conversion process is well known in the art.

Step 340: Mail server **256** obtains the SMS message from data storage **254** and converts it the text part of the e-mail message. This conversion process is well known in  
5 the art. The e-mail message is subsequently prepared, and includes, in this example, a text part and a voice part. The voice part is a voice file (e.g. <file\_name>.wav file) that appears as an attachment to the textual message.

Step 350: The message is sent from mail server **256** to e-mail client **215** through  
10 mail gateway **245**. E-mail client **215** receives the MPM as an e-mail message with a voice attachment.

E-mail client **215** receives an MPM message as an e-mail message. The subject field contains the text or part of it, and the e-mail body contains the full text. The sender is presented as the mobile subscriber number, name, or e-mail address. E-mail user may  
15 listen to the content of a voice attachment, using a standard audio player (e.g. Windows Media Player ®, Real Player ®, etc.).

The foregoing description of the embodiments of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to  
20 limit the invention to the precise form disclosed. It should be appreciated that many modifications and variations are possible in light of the above teaching. It is intended that the scope of the invention be limited not by this detailed description, but rather by the claims appended hereto.

**WHAT IS CLAIMED IS:**

1. A system for enabling the creation of email compatible multi-part messages (MPM) from mobile communication devices, comprising:
  - an application server for managing the MPM creation and transfer processes;
  - a mail server for creating and handling email messages from the MPM;
  - at least one database for storing the system data;
  - a voice interface unit for transferring voice commands to and from said application server;
  - a data interface unit for transferring data commands to and from said application server; and
  - a network capable of carrying data between said application server, said mail server, said database, said voice interface unit and said data interface unit.
2. The system of claim 1, wherein said mail server further comprises means for creating an e-mail message from said MPM, such that said MPM's text part is said e-mail message's text, and said MPM's voice part is said e-mail message's attachment.
3. The system of claim 1, wherein said database is adapted to store data selected from the group consisting of voice messages and text messages.
4. The system of claim 2, wherein said email attachment is selected from the group of file formats consisting of WAV, MP3, AU, AUD AIFF and AIF.
5. The system of claim 1, further comprising a mail gateway, for interfacing between said mail server and said e-mail client.
6. The system of claim 1, wherein said voice interface unit includes a mechanism for enabling a voice connection with said wireless communication device.

7. The system of claim 6, wherein said voice interface unit further comprises a mechanism for recording voice messages.
8. The system of claim 1, wherein said data interface unit includes a mechanism for transferring of said text between said wireless communication device and said application server.
9. The system of claim 1, wherein said e-mail message is in a format selected from the group consisting of SMTP, ESMTP and MIME.
10. The system of claim 1, wherein said network is selected from the group consisting of a local area network and wide area network.
11. The system of claim 1, wherein said wireless communication device is selected from the group consisting of:
  - a) cellular phone with a SIM toolkit;
  - b) SMS enabled cellular phone; and
  - c) cellular phone with navigation software.
12. The system of claim 11, wherein said navigation software can process data requests in markup languages selected from the group consisting of WML, CHTML, HTML, and XML.
13. The system of claim 12, wherein said navigation software is an Internet browser.
14. The system of claim 1, wherein said application server further comprises instructions selected from the group consisting of:
  - a) controlling said voice interface unit;
  - b) controlling said data interface unit;

- c) controlling said database;
- d) controlling said mail server;
- e) composing said MPM;
- f) storing said MPM; and
- g) managing said MPM.

15. The system of claim 1, wherein said mail server further comprises instructions selected from the group consisting of transforming voice messages to voice files, and transforming text messages to text based e-mail format.

16. A method for enabling the creation of email messages from multi part messages (MPM) from wireless communication devices, the method comprising:

- a) entering a textual message using said communication device text input interface;
- b) transferring said textual message to a data interface unit;
- c) storing said textual message in a database;
- d) establishing a voice session between said wireless communication device and a voice interface unit, via a mobile switching center (MSC);
- e) recording a voice message over said voice session;
- f) storing said voice message in a database;
- g) transforming said voice message into a voice file;
- h) composing an e-mail message by converting said text message into an e-mail message, and attaching said voice file to said e-mail message;

17. The method of claim 16, further comprising transferring said e-mail message to an e-mail client.

18. The method of claim 16, wherein said text input interface is a keypad.

19. The method of claim 16, wherein said text input method is a touch-sensitive screen.

20. The method of claim 16, wherein said entering a textual message includes entering at least an e-mail address.
21. The method of claim 16, wherein said establishing voice session comprises executing dialing.
22. The method of claim 21, wherein said dialing requires dialing a pre-defined number.
23. The method of claim 21, wherein said dialing requires dialing a dialed number provided by said system.
24. The method of claim 21, wherein said dialing is manual.
25. The method of claim 21, wherein said dialing is automatic.
26. The method of claim 16, wherein said establishing of a voice session comprises sending a short message from said system to initiate said voice session.
27. The method of claim 26, wherein said initiating of a voice session comprises replying to said short message by short message.

28. The method of claim 16, wherein said wireless communication device is selected from the group consisting of:
  - a) cellular phone with a SIM toolkit;
  - b) SMS enabled cellular phone; and
  - c) cellular phone with navigation software.
29. The method of claim 28, wherein said navigation software can process data requests in markup languages selected from the group consisting of WML, CHTML, HTML, and XML.
30. The method of claim 29, wherein said navigation software includes an Internet browser.
31. A computer executable code for enabling wireless communication devices to create email messages from multi-part messages (MPM), such that these messages are usable by standard email client software, said code comprising:
  - a) receiving a text message from a wireless communication device, via a short message service center (SMSC) and data interface, to an application server;
  - b) storing said text message in a database connected to said application server;
  - c) establishing a voice session between said wireless communication device and a voice interface, via mobile switching center (MSC), for recording a voice message;
  - d) recording a voice message, over the voice session;
  - e) storing said voice message in a database;
  - f) transforming said voice message into a voice file;
  - g) composing an e-mail message from said text message, by a mail server; and
  - h) attaching said voice file to said email message, by said mail server.

32. The computer executable code of claim 31, wherein said code further comprises the step of transferring said e-mail message, by said mail server, to the e-mail client software, via a mail Gateway.

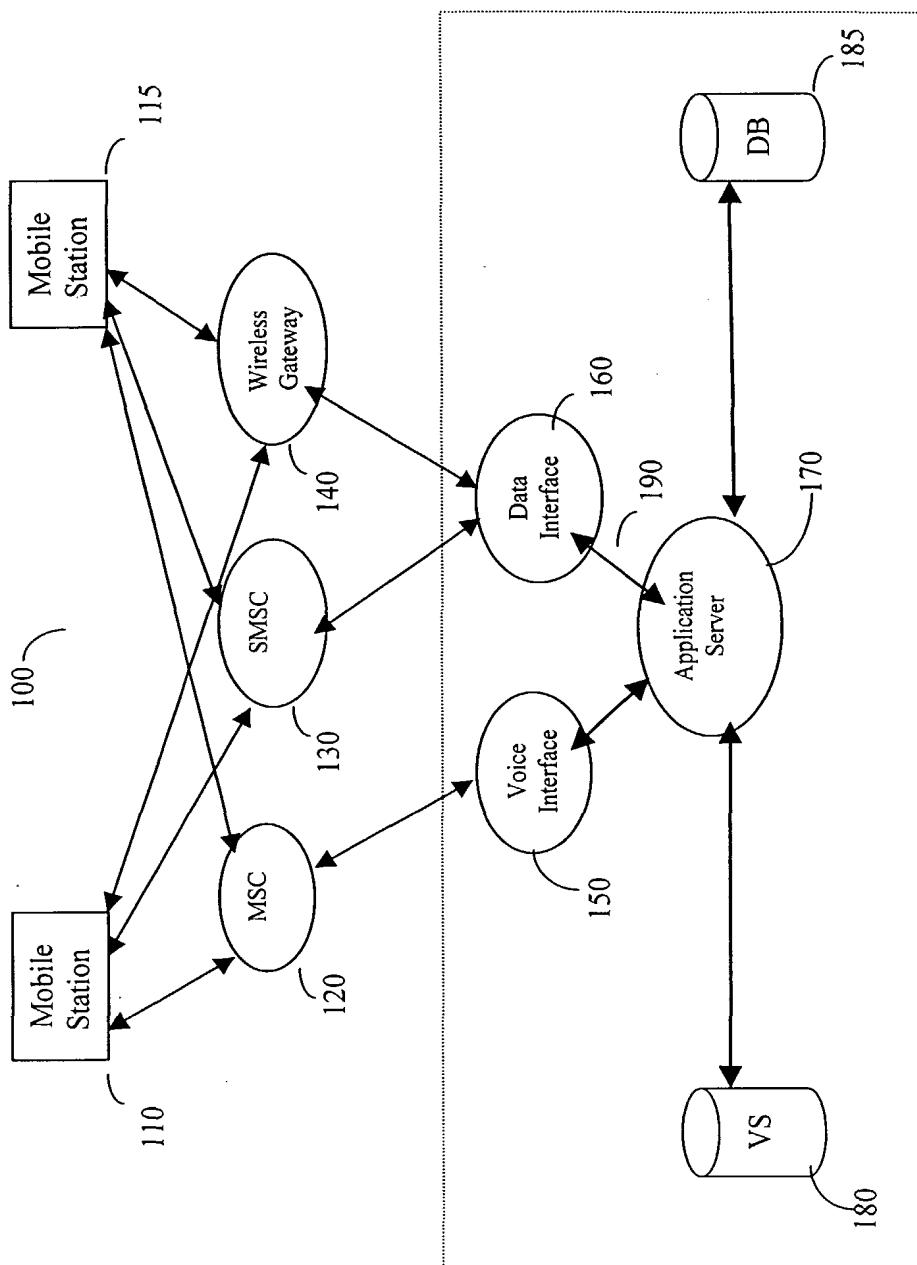


Figure 1

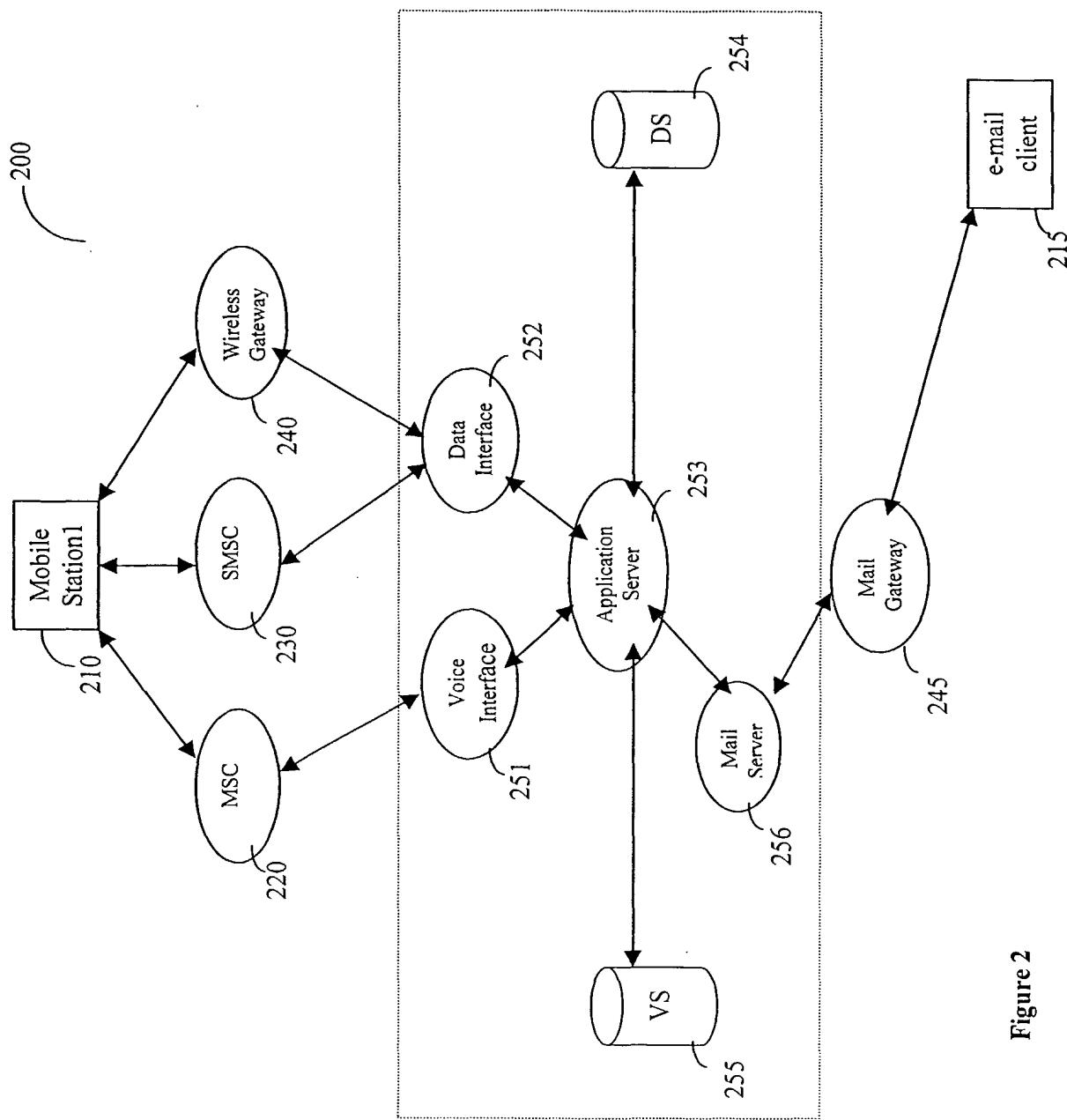


Figure 2

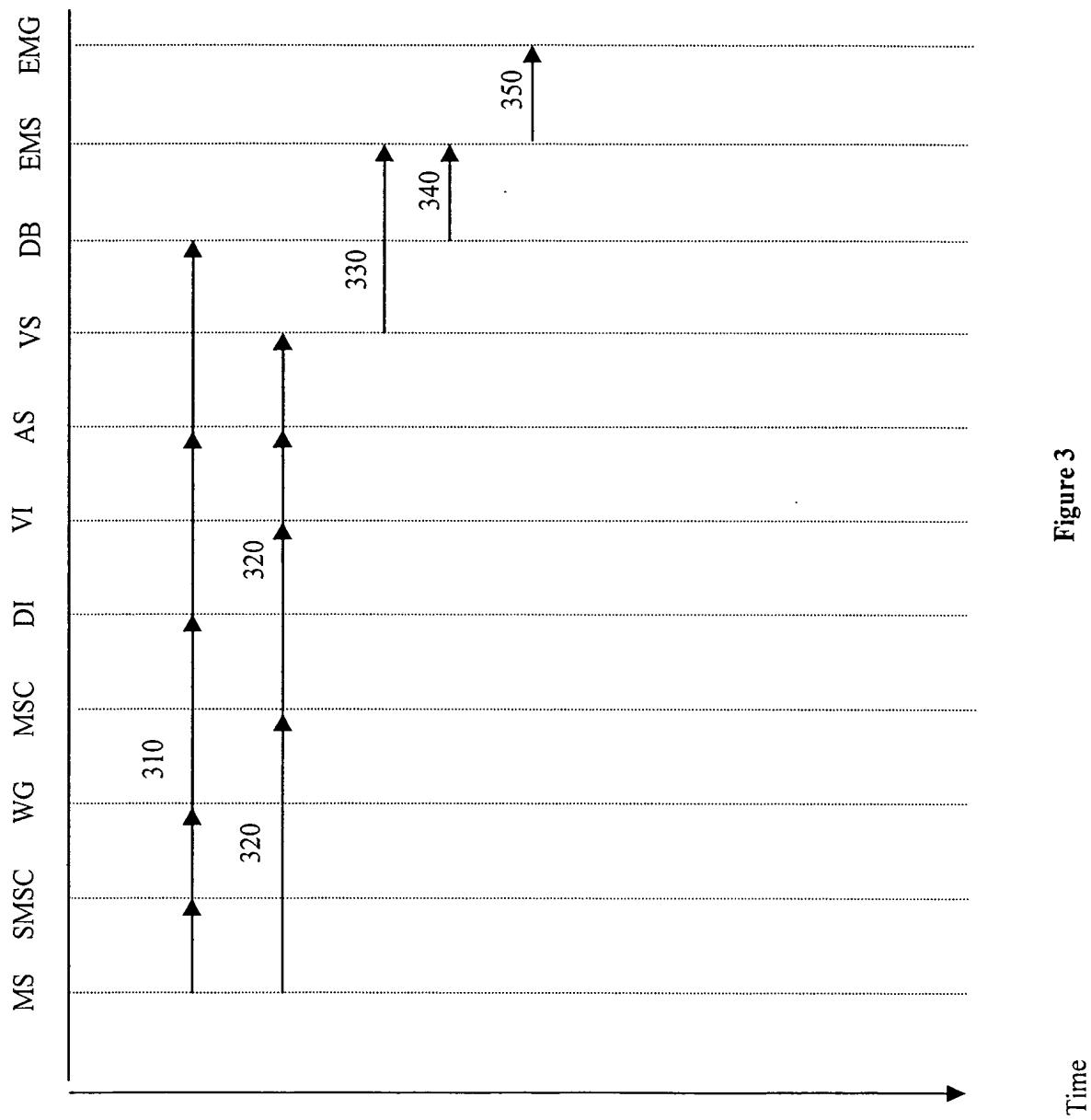


Figure 3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/09621

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04M 1/64  
US CL : 455/412

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 455/412

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,385,306 B1 (BAXTER, JR.) 02 March 2000 (02.03.2000), C1, L33-65, C2, L64-67 to C3, L1-13 and C4, L45-67, C5, L10-35 and C5, L56-67, 1-10 and C8, L64-67 to C9, L1-20 and C9, L59-60 and C10, L6-15, and C11, L17-22 and L42-50 and C11, L65-67 to C12, L1-10 and figures 1 (#36), 4, 6 (#20, #240), 11, 12 and	1-4, 7-914-18, 20-27 and 31/5, 6, 10-13, 19, 28-30 and 32
---		
Y	10 and C8, L64-67 to C9, L1-20 and C9, L59-60 and C10, L6-15, and C11, L17-22 and L42-50 and C11, L65-67 to C12, L1-10 and figures 1 (#36), 4, 6 (#20, #240), 11, 12 and	
Y	US 6,351,523 B1 (DETLEF) 22 March 1999 (22.03.1999) Figure 1 (#36) and C4, L45-50, Figure 1, #12 is a phone, Figure 1 (#52 and #32), Figure 1, #12 and Figure 2, Figure 1 shows Internet, Figure 1 #38 (email gateway)	5, 6, 10, 11, 13, 28, 30 and 32
Y	US 6,216,013 B1 (MOORE et al) 16 November 1999 (16.11.1999) Figure 2 and C3, L5-13	19

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance		
"E" earlier application or patent published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search  01 July 2002 (01.07.2002)	Date of mailing of the international search report  06 AUG 2002
Name and mailing address of the ISA/US  Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer  Daniel Hunter Telephone No. 703-306-0377